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(54) Vehicle hitch assembly, including a detachable towing hook.

(57) The invention relates to a vehicle hitch assembly, including a detachable towing hook (1) for coupling a caravan, a trailer or a like towable apparatus to a vehicle. The vehicle hitch assembly comprises said towing hook (1), whose body section (2) is on the one hand provided with attachment members for coupling towing hook (1) detachably in connection with a vehicle and on the other hand with a towing ball (2a) or a like, said attachment members included in body section (2) being located at a distance from each other in the longitudinal direction (Kv) of body section (2). In addition, the hitch assembly includes a mounting block (7), comprising a box member (8) having a free internal dimension which substantially matches the corresponding external dimension of said body section (2) and being provided with counter-members for said attachment members as well as with a means (4c) for supporting said body section (2). The mounting block (7) is fixed in connection with a vehicle, whereby the attachment of towing hook (1) and mounting block (7) to each other, in view of bringing said hitch assembly (1, 7) to an operative position, is adapted to be effected by changing the longitudinal direction (Kv) of towing hook (1) and/or the longitudinal direction (Kk) of mounting block (7) substantially in a single direction around a tipping centre, the latter consisting of at least some of the attachment members and the corresponding counter-memrs.

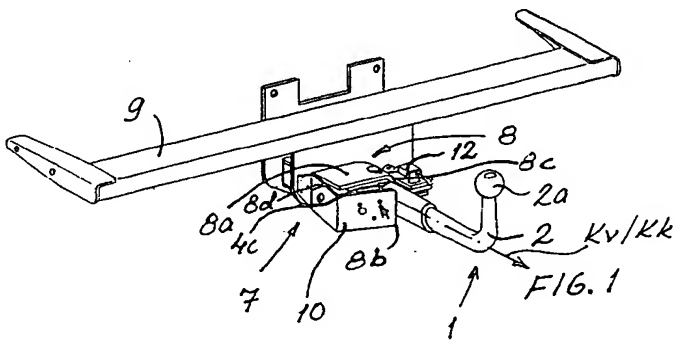

FIG. 1

EP 0 491 241 A1

A vehicle hitch assembly, including a detachable towing hook for coupling a caravan, a trailer or a like towable apparatus to a vehicle, comprising:

- said towing hook whose body section is on the one hand provided with attachment members for coupling the towing hook detachably in connection with a vehicle and on the other hand with a towing ball or a like, said attachment members included in the body section being located at a distance from each other in the longitudinal direction of said body section, and
- a mounting block, comprising a housing member having a free internal dimension which substantially matches the corresponding external dimension of said body section and being provided with counter-members for said attachment members as well as with a means for supporting said body section, said mounting block being fixed in connection with a vehicle.

As a solution, a detachable and hitchable towing hook is prior known e.g. from Finnish Patent publications 63187 and 74657.

Patent publication 63187 discloses a complicated leverage-operated detachable and attachable hitch assembly, wherein a towing hook is braced on a retaining device in vertical direction at three points of support, located at a distance from each other in the longitudinal direction of said towing hook to provide the angular points of a triangle, and said points of support being fixed in lateral direction to the retaining device.

Patent publication 74657 discloses a detachable and attachable towing hook that can be hitched to a body section, wherein the attachment is achieved on the one hand by means of conical stop faces provided at various points in the longitudinal direction of said towing hook and on the other hand by means of stop faces located matchingly on the body section as well as by means of an eccentric pin.

Referring to what is described above, the former solution is highly complicated in terms of its principle and design and includes a plurality of different, moveably journalled components. Thus, especially in Nordic conditions, as a result of freezing, soiling and other similar reasons, the solution disclosed in the cited publication has a poor operating and working reliability particularly in difficult conditions.

A solution set forth in the latter publication is simple in terms of its operating and working principle. A weakness in this solution is, however, that, with a towing hook under stress, due to the disposition of stop faces, the highest load will be applied to a stop face located at the wedge-like tapering end of said towing hook. Thus, in principle, the towing hook is at its narrowest within the area of the most severe stress which in practice, as a result of high surface tensions, leads to the wearing of stop faces and, hence, to the slackening of the structure.

A common feature in both of the above solutions is the inclusion of movably articulated mechanisms, which are hazardous factors in terms of safety. Furthermore, in order to electrically couple a trailing apparatus, such as a caravan or a like, to a vehicle, the above solutions require totally separate installations, as there are no suitable attachment surfaces included in themselves.

An object of a hitch assembly of the invention, including a detachable towing hook, is to provide a decisive improvement to the above drawbacks and, thus, to substantially raise the available prior art. In order to achieve this object, a hitch assembly of the invention, including a detachable towing hook, is substantially characterized in that, following the insertion of a towing hook and a mounting block within each other, the longitudinal direction of said towing hook being substantially different from that of the mounting block, the attachment thereof to each other, in view of bringing the hitch assembly to an operative position, is adapted to be effected by changing at least one of said longitudinal directions substantially in a single direction around a tipping centre which consists of at least some of the attachment members and corresponding counter-members, whereafter, in order to achieve said operative position, the towing hook and the mounting block are hitchable to each other as the longitudinal directions coincide, whereby at least a part of the body section and said means as well as the attachment members and the counter-members are in contact with each other and whereby the detachment of said towing hook and mounting block from each other is adapted to be effected in reversed order.

The most significant benefits offered by a hitch assembly of the invention include simplicity, reliability in working and operation, which are essential features especially in demanding conditions. In terms of safety, the hitch assembly is substantially improved over the current mechanisms, since the attachment and locking or hitching of a towing hook is achieved by means of fixed components without pivotable spring, cam or like mechanisms.

The invention will be described in detail in the following specification with reference made to the accompanying drawings, in which

fig. 1 shows a perspective view of one embodiment of a hitch assembly attached to an auxiliary frame,

fig. 2 shows the hitch assembly of fig. 1 in a condition with a towing hook detached,

fig. 3 is a sectional view showing the inser-

tion of a towing hook inside a mounting block,

fig. 4 shows a sectional view of a towing hook in a position required by the operative condition of a hitch assembly,

fig. 5 is a sectional view showing a hitch assembly in its operative position, and

fig. 6 shows a side view of an embodiment provided with a spring-structured locking means.

A hitch assembly of the invention includes a detachable towing hook 1 and a mounting block 7. In the illustrated embodiment, said detachable towing hook 1 comprises a body section 2 provided with a towing ball 2a and further with attachment members 4a, the latter comprising two vertical slots 4a1 on the opposite side faces of body section 2 and extending perpendicularly to the longitudinal direction Kv of body section 2 and a single horizontal plate 4a2 extending beyond the side face of body section 2 and perpendicularly to the longitudinal direction Kv of body section 2. The mounting block 7 includes counter-members 4b, comprising pins 4b1 fitting in connection with said slots 4a1 in the operative position of hitch 1, 7 and limiting the longitudinal movement Kv of towing hook 1 as well as plates 4b2 fitting in connection with said plate 4a2 and provided with a wedge assembly 4d, the latter limiting the movement of towing hook 1 in horizontal plane. The mounting block 7 also includes a bearing surface 4c which supports body section 2 in said operative position.

The mounting block 7 of a hitch assembly 1, 7 shown in fig. 1 is attached in an operatively horizontal position to a separate auxiliary frame or chassis 9 fastened to the body of a vehicle, said attachment being effected on the one hand by means of a base plate 3 substantially closing one end of mounting block 7 and on the other hand by means of a second identically directed support plate 5, located at another point in the longitudinal direction Kk of mounting block 7 extending perpendicularly to auxiliary frame 9. The mounting blcok 7 includes a housing or box member 8 having its top portion 8a, bottom portion 8b and one of its side portions 8c manufactured from a continuous sheet material by bending or in a like manner and the side portion between said base plate 3 and support plate 5 in said box member 8 is made up by a separate plate 11 welded to box member 8. The hitch assembly 1, 7 also includes a swingable protective cover 10, serving as a protection element and provided with a return spring and capable of being provided with a cross-connection device for electric coupling. As a locking member said hitch assembly 1, 7 includes a wedge 4d, whose retaining position is secured by providing said mounting block 7 with a safety catch 12 pivoting on top of said wedge 4d.

Fig. 1 shows a hitch assembly 1, 7 in an operative position with a towing hook 1 fastened to a mounting block 7 in a totally immovable manner. Thus, the movement of towing hook 1 is restricted in vertical direction by the top portion 8a and bottom portion 8b of box member 8, in lateral direction by pins 4b1, side portion 8c of the box member and wedge 4d, and in axial direction Kv by pins 4b1 and wedge 4d, said bearing surface 4c comprising the internal surface of said side portion 8c, located between top portion 8a and bottom portion 8b and having a curvature that matches the outer diameter of body section 2.

In fig. 2, the mounting block 7 of hitch assembly 1, 7 is in a preparatory position, wherein the action of a return spring causes a protective cover 10 to close the box member in side portion 8d as well as one end 7' of mounting block 7. In the illustrated embodiment, said body section 2 of towing hook 1 is made of a contimuous material rod with a circular cross-section and its end facing the attachment members is designed to facilitate its introduction into said mounting block 7.

Figs. 3, 4 and 5 illustrate sequentially how a hitch assembly 1, 7 fitted with a cross-connection device 10b is set in an operative position. Fig. 3 shows a first sequence in which said towing hook 1 is introduced inside mounting block 7 in a manner that the foremost slot 4a1 at the end of towing hook 1 facing the attachment members produces a pivot P together with the respective foremost pin 4b1.

In fig. 4, the towing hook 1 is pivoted in horizontal plane in a manner that both slots 4a1 are in contact with pins 4b1, plate 4a2 respectively with plates 4b2, and the body section 2 of towing hook 1 with bearing surface 4c.

Fig. 5 shows the hitch assembly 1, 7 in an operative position, whereby the wedge 4d fitted in holes made in plates 4a2 and 4b2 provides for a final locking of towing hook 1 and mounting block 7 to each other. The purpose of safety catch 12 is to prevent the disengagement of wedge 4d as a result of vibration or the like.

Fig. 6 shows one embodiment of an alternative locking arrangement, wherein a wedge 4d is replaced by a spring-equipped locking lever 6. In this case, the locking and releasing of towing hook 1 and mounting block 7 is effected by lifting said locking lever 6.

The disengagement of towing hook 1 from mounting block 7 is naturally effected in a reversed order with respect to what is described above.

The invention is not limited to the above embodiment but it can be subjected to considerable modifications. For example, a mounting block can be adapted to be fastened in an inclined position, whereby the longitudinal direction of a mounting

block forms a certain angle relative to horizontal plane and whereby, accordingly, the body section of a towing hook is given a corresponding change of direction. On the other hand, a mounting block can be adapted to be pivotably mounted on its base, whereby the attachment of a towing hook and a mounting block to each other is achieved by substantially changing the longitudinal direction of a mounting block. According to the invention, a mounting block can naturally be also adapted to be mounted on its base e.g. in a functionally vertical direction in a position rotated relative to the above embodiment, the attachment of a towing hook to a mounting block being effected by moving said towing hook in vertical direction, e.g. from up downwards, and said towing hook attachment members being respectively located on the top and/or bottom faces of a body section. A laterally extending plate or a like included in the towing hook attachment members can of course be located just as well on the side of a towing hook, whereby its stop face can be made up by the top portion of a box member. The wedge assembly serving as a locking means can also be replaced in a per se known manner by a tension-spring equipped retaining pin, whereby a hole thus serving as an attachment member can be made directly in the surface of a towing hook. The mounting block can also be manufactured as an integral unit, e.g. by casting. The towing hook or part of its body section can be manufactured from material rods or the like of various cross-sections, and the same applies also to the pins serving as counter-members. The constructional simplicity of a hitch assembly of the invention facilitates the use of most diversified materials and techniques in the manufacture of its related components.

Claims

1. A vehicle hitch assembly, including a detachable towing hook (1) for coupling a caravan, a trailer or a like towable apparatus to a vehicle, comprising:
   - said towing hook (1) whose body section (2) is on the one hand provided with attachment members (4a) for coupling the towing hook (1) detachably in connection with a vehicle and on the other hand with a towing ball (20) or a like, said attachment members (4a) included in body section (2) being located at a distance from each other in the longitudinal direction (Kv) of body section (2), and
   - a mounting block (7), comprising a housing or box member (8) having a free internal dimension which substantially matches the corresponding external dimension of said body section (2) and being provided with counter-members (4b) for said attachment members (4a) as well as with a means (4c) for supporting said body section (2), said mounting block (7) being fixed in connection with a vehicle,

   characterized in that, following the insertion of towing hook (1) and mounting block (7) within each other, the longitudinal direction (Kv) of towing hook (1) being substantially different from that (Kk) of mounting block (7), the attachment thereof to each other, in view of bringing said hitch assembly (1, 7) to an operative position, is adapted to be effected by changing at least one of said longitudinal directions (Kk/Kv) substantially in a single direction around a tipping centre P which consists of at least some of the attachment members (4a) and corresponding counter-members (4b), whereafter, in order to achieve said operative position, said towing hook (1) and mounting block (7) are hitchable to each other as longitudinal directions (Kk, Kv) coincide, whereby at least a part of body section (2) and said means (4c) as well as attachment members (4a) and counter-members (4b) are in contact with each other and whereby the detachment of said towing hook (1) and mounting block (7) is adapted to be effected in reversed order.

2. A hitch assembly (1, 7) as set forth in claim 1, **characterized** in that setting the hitch assembly (1, 7) in said operative position is adapted to be effected in a substantially horizontal direction, said attachment members (4a) included in body section (2) of towing hook (1) comprising on the one hand at least one recess surface, such as a slot (4a1) or a like, located on the side face or a part of the side face of body section (2) and preferably extending perpendicularly to the longitudinal direction (Kv) of said body section (2) and, on the other hand, at least one extension, such as a plate (4a2) or a like, preferably extending beyond the side face of body section (2) and perpendicularly to the longitudinal direction (Kv) of body section (2), and said counter-members (4b) included in box member (8) of mounting block (7) comprising on the one hand a projecting surface, such as a pin (4b1) or a like, setting in said operative position in contact with said recess surface, such as said slot (4a1) or a like, and limiting the longitudinal (Kv) movement of towing hook (1) and, on the other hand, at least one stop face, such as a plate (4b2) or a like, setting in contact with said extension, such as said plate (4a2) or a like,

said mounting block (7) also comprising a bearing surface (4c) or a like, serving as said means for supporting body section (2) and having a configuration which substantially matches the corresponding top and bottom surfaces or parts thereof as well as at least one of the side faces or a part thereof included in the body section whereby, in order to lock or hitch towing hook (1) and mounting block (7) to each other, said extension, such as plate (4a2) or a like, and said stop face, such as plate (4b2) or a like, include a locking means, such as a wedge assembly (4d) or a like, limiting the movement of towing hook (1) at least in a substantially horizontal plane.

3. A hitch assembly as set forth in claim 1 or 2, **characterized** in that said attachment members (4a) comprise two of said recess surfaces, such as slots (4a1) or the like, which are located on the opposite faces of body section (2) or on parts thereof and preferably at different locations in the longitudinal direction (Kv) of body section (2), said counter-members (4b) comprising extension surfaces, such as pins (4b1) or the like, arranged at the corresponding locations on said box member (8).

4. A hitch assembly as set forth in any of claims 1 - 3, **characterized** in that said mounting block (7) includes a protection member (10) which, in the preparatory position of mounting block (7) with said towing hook (1) detached therefrom, substantially closes at least the outermost end (7') in the longitudinal direction (Kk) of mounting block (7).

5. A hitch assembly as set forth in claim 4, **characterized** in that said protection member comprises a pivotable plate structure (10) or a like, which is provided with a continous-action closing means, such as a spring (10a) or a like.

6. A hitch assembly as set forth in claim 4 or 5, **characterized** in that said protection member (10) comprises a connecting means, such as a cross-connection device (10b) or a like, for electrically coupling a caravan, a trailer or a like towable apparatus to a vehicle.

7. A hitch assembly as set forth in any of preceding claims 1 - 3, **characterized** in that said mounting block (7) is preferably adapted to be fastened in a substantially horizontal position, such as to a separate auxiliary frame (9) or a like carried by the body of a vehicle, the longitudinal direction (Kk) of mounting block (7) extending in a substantially horizontal plane, said fastening being preferably effected on the one hand by means of a base plate (3) or a like, closing one of the ends of mounting block (7), and on the other hand by means of a second support plate (5) or a like, placed at a different location in the longitudinal direction (Kk) of mounting block (7) and preferably extending in the corresponding direction.

8. A hitch assembly as set forth in any of preceding claims 2 - 7, **characterized** in that the box member (8) of said mounting block (7) comprises a top portion (8a), a bottom portion (8b) and at least one side portion (8c), which are made by working, shaping, machining or a like treatment of continuous sheet material, and that said mounting block (7), with the exception of said outermost end (7') thereof and/or the parts closed by said protection member, is preferably designed as a substantially closed plate structure or a like.

9. A hitch assembly as set forth in any of preceding claims 1 - 7, **characterized** in that said box member (8) is manufactured by working or similarly treating a continuous shaped profile, such as a tubular beam or a like.

10. A hitch assembly as set forth in any of preceding claims 1 - 3, **characterized** in that at least said body section (2) of said towing hook (1) is manufactured by shaping, forming, working or by a like treatment of a continuous material rod or a like, having preferably a circular cross-section.

11. A hitch assembly as set forth in any of preceding claims 1 - 9, **characterized** in that the body section (2) of said towing hook (1) comprises at least two components, which are made of continuous rod material, such as hexagonal rod, square rod, circular rod or a like, and which are joined together by welding or a like treatment.

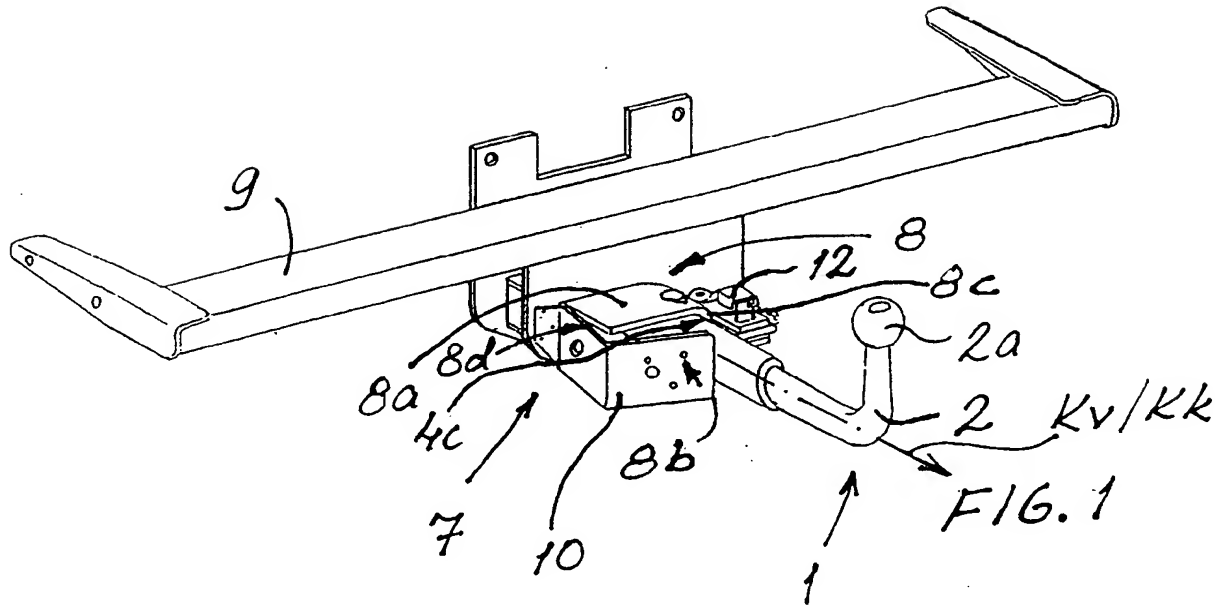

FIG. 1

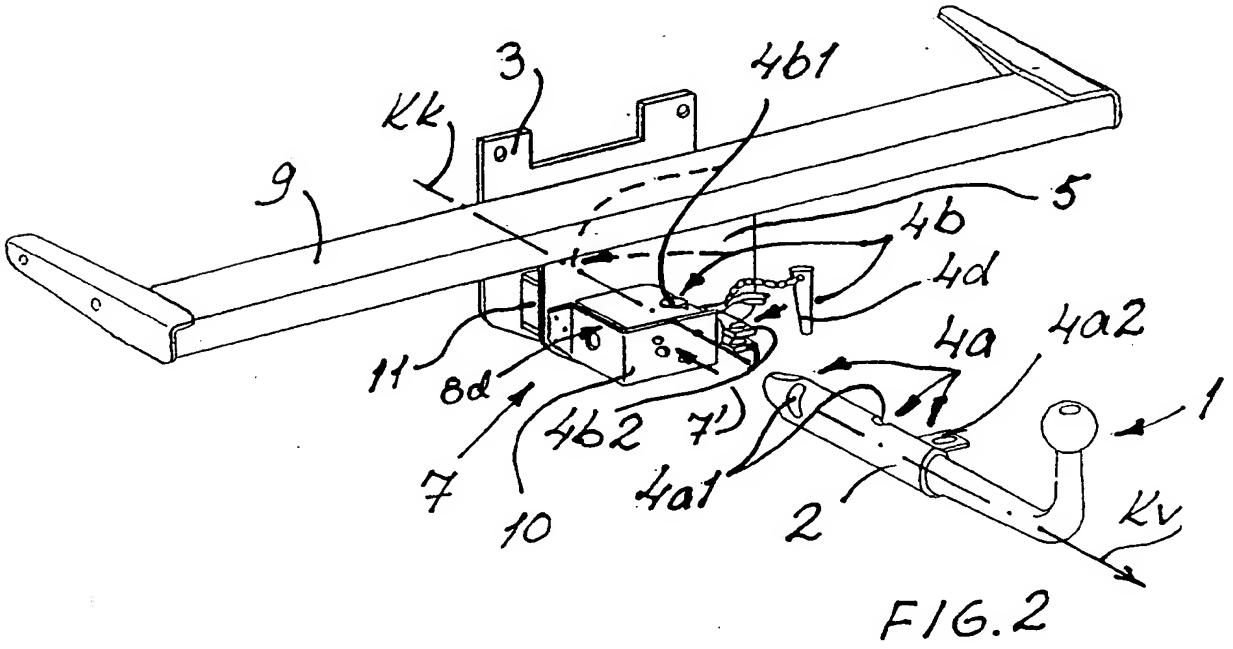

FIG. 2

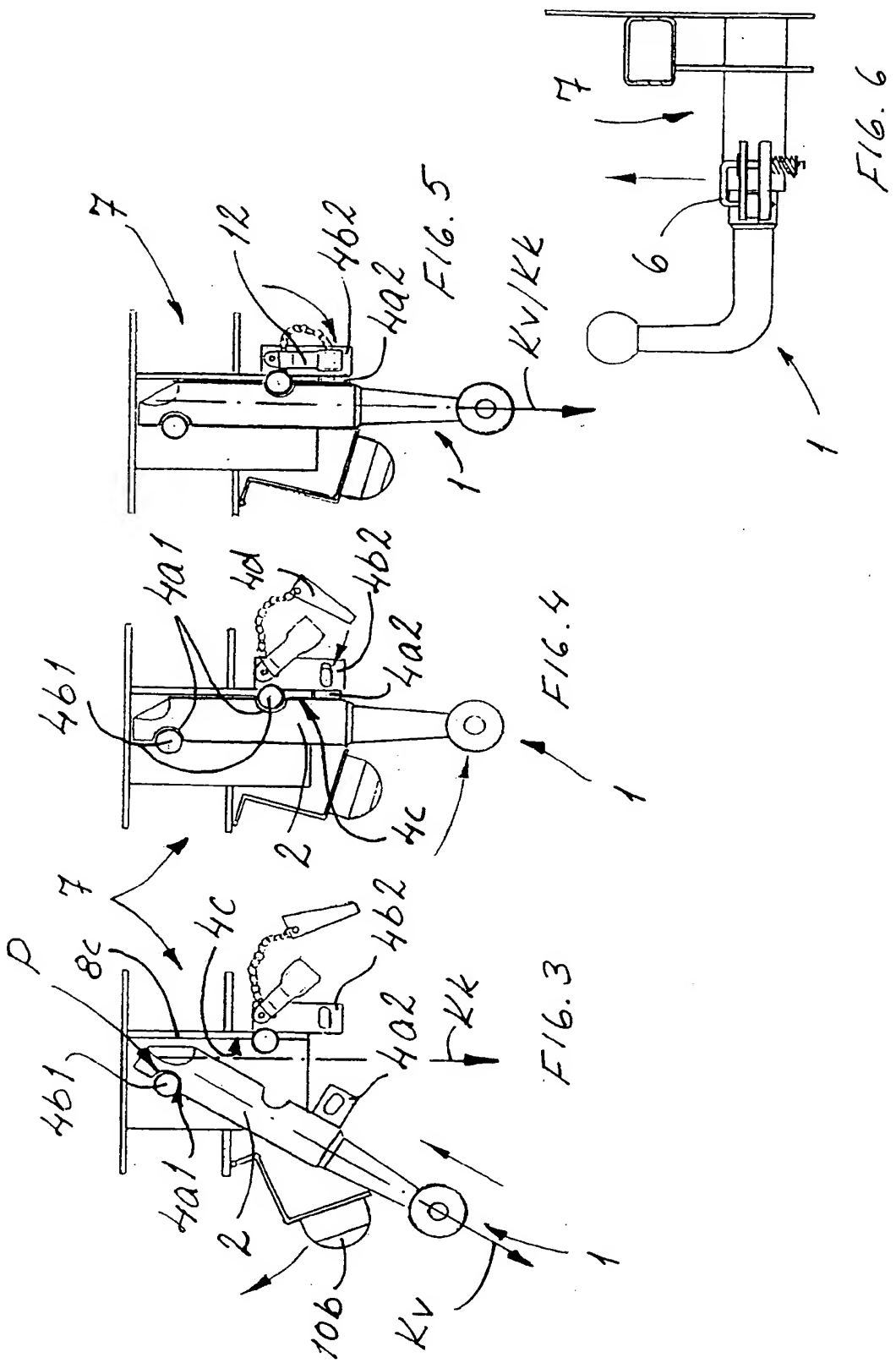

FIG. 3

FIG. 4

FIG. 5

FIG. 6

European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 91 12 0888

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
Y	EP-A-0 301 153 (MIVAR)	1	B60D1/52
A	* the whole document *	2-3,7-10	F16B3/00
Y	DE-U-8 907 012 (DICKMANN) * figures *	1	
A	EP-A-0 151 099 (SLÄPVAGNSKOPPLINGAR) * abstract; figures *	1-3,11	
A	US-A-4 540 194 (DANE) * column 2, line 32 - line 45; figures *	1,4-5	
A	FR-A-2 390 304 (BRINKS B. V.) * claims 1-3; figures *	1-3	
D	& FI 63187		
A	US-A-2 531 859 (MOCK) * figures *	1	
A	EP-A-0 160 934 (JÜRGENS) * figures *	1	

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

B60D
F16B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	09 MARCH 1992	GONZALEZ-GRANDA C.

CATEGORY OF CITED DOCUMENTS

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